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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/635,652

08/07/2003

Kcizo Ohta

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8790

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EXAMINER

THOMASSON, MEAGAN J

ART UNIT

PAPER NUMBER

3714

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/24/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/635,652

Applicant(s)

OHTA, KEIZO

Examiner

Meagan Thomasson

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3714

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 September 2006.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☐ Claim(s) \_\_\_\_\_ is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 07 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsumoto (US 5,043,922).

Claims 1, 6 and 7: Matsumoto discloses A computer-readable storage medium for storing a shadow volume generation program that causes a computer to generate a shadow volume used for rendering a shadow cast by an object placed in a three-dimensional virtual space, wherein the shadow volume generation program causes the computer to execute the steps of:

- writing a Z value corresponding to each pixel within a predetermined area including at least the shadow casting object, into a Z-buffer, using a light source placed in the virtual space as a viewpoint (col. 6, lines 25-39); and
- generating the shadow volume from a plane object by determining a position of each vertex of a plurality of polygons composing the plane object, with regard to a direction perpendicular to a surface of the plane object in accordance with the Z value of each pixel written in the Z-buffer (col. 7, lines 26-35).

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2. A storage medium according to claim 1, wherein

- a shape of the plane object is defined by a plurality of vertices, each having different combination of an X-coordinate and a Z-coordinate (col. 7, lines 26-56), and
- in the shadow volume generation step, a Y-coordinate of each vertex of the plane object is determined in accordance with the Z value of each pixel written in the Z-buffer (col. 7, lines 9-56).

3. The storage medium according to claim 1, wherein

- the light source is a point light source (col. 12, lines 24-57 or col. 5, line 20), and
- the shadow volume generation step includes a step of determining a position of each vertex of the plane object with regard to a direction parallel to a surface thereof in accordance with the Z value of each pixel written in the Z-buffer (col. 12, lines 24-57). The parallel light is inherently disclosed by Matusmoto because multiple light sources arranged in a line is the equivalent of a parallel light source.

4. The storage medium according to claim 3, wherein

- a shape of the plane object is defined by a plurality of vertices, each having a different combination of an X-coordinate and a Z-coordinate (col. 7, lines 9-55), and

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- in the shadow volume generation step, the X-coordinate and the Z-coordinate of each vertex of the plane object are determined in accordance with the Z value of each pixel written in the Z buffer (col. 7, lines 9-55).

5. The storage medium according to claim 1, wherein the shadow volume generation program further causes the computer to execute the steps of:

- placing the shadow volume generated at the shadow volume generation step in the virtual space in a virtual manner so that a height direction of the shadow volume coincides with a direction of light emitted from the light source (col. 7, line 40 – col. 8, line 13), and
- rendering the shadow of the shadow casting object using the shadow volume placed in a virtual manner (col. 7, line 40 – col. 8, line 30).

### ***Response to Arguments***

Applicant's arguments filed September 20, 2006 have been fully considered but they are not persuasive.

Regarding applicant's argument that Matsumoto fails to disclose "generating the shadow volume from a plane object by determining a position of each vertex of a plurality of polygons composing the plane object with regard to a direction perpendicular to a surface of the plane object in accordance with the Z value of each pixel written in the Z-buffer", Fig. 20 discloses a plane object composed by a plurality of polygons, wherein the direction perpendicular to each of the plane objects is determined.

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Matsumoto refers to the process as the identification of "normal vectors" (column 13, lines 28-41), wherein it is well known to one of ordinary skill that a normal vector is perpendicular to a given surface. The shadow volume generation process disclosed by Matsumoto also involves the determination of the Z value of each pixel written in the Z buffer, wherein a Z value is the distance from the viewpoint to the object, referred to by Matsumoto as a depth value, in col. 2, lines 31-47; "a Z-buffer (depth buffer) is modified to store information needed for shadow generation in addition to depth values". Col. 6, lines 54 – 69 further disclose the invention as claimed, wherein an overview of the system is described as follows (emphasis added):

FIG. 5 shows a graphics system embodying the present invention. In the figure, the graphics system generates pixel data by processing a **polygon-segmented surface model**, and displays the pixel data on a display screen. The basic functions of the graphics system include hidden-surface elimination, Gouraud shading, and shadow generation.

A graphics application is executed on a host computer 1 to supply polygon data represented in world coordinates, that is, **coordinates and color information of each vertex of a polygon**, as well as similar shadow polygon data, to a transformation section 2. The transformation section 2 transforms the data to screen coordinates and depth data on the screen through a perspective transformation and a scale transformation.

Regarding applicant's argument that the shadow volume generation process of Matsumoto fails to disclose a "programmed logic circuit", interpreted by the examiner to be a programmable logic controller (PLC), is, in its broadest interpretation, a processor. Matsumoto discloses the use of a processor to perform the shadow volume generation process throughout the specification.

Regarding applicant's argument that the previous office action implicitly alleges that Gouraud shading discloses the limitations of claims 1, 6, and 7, and that, in general and as used in Matsumoto, Gouraud shading applies only to shading and shade generation, not shadowing and shadow generation, the examiner contends that Gouraud shading is only a single aspect of the invention disclosed by Matsumoto, and that the shadow generation process is disclosed as cited above.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Meagan Thomasson whose telephone number is (571) 272-2080. The examiner can normally be reached on M-F 830-5.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Olszewski can be reached on (571) 272-6788. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Meagan Thomasson  
January 20, 2007

Handwritten signature of Robert Olszewski, dated 1/22/07.

ROBERT OLSZEWSKI  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 3700